CLAIMS:

1. Light emitting apparatus comprising:

a) a light source including a light emitting diode device; and

b) a cooling system for cooling the light source comprising:

i) a thermoelectric cooling device connected via a heat conductor to the light source; and

ii) a heat exchange system for removing heat from the thermoelectric cooling device, the thermoelectric cooling device being positioned between the heat conductor and the heat exchange system.

2. Apparatus according to claim 1, wherein the apparatus is so arranged that, in use, the temperature of the region of the heat conductor immediately adjacent to the thermoelectric cooling device is able to be maintained below -10° Celsius.

3. Apparatus according to claim 1 or claim 2, wherein the apparatus is arranged to emit, in use, light having an optical power density of greater than $0.1Wcm^{-2}$.

4. Apparatus according to any preceding claim, wherein the light source is arranged and configured to emit light, in use, having an energy peak at a wavelength between 570nm and 600nm.

5. Apparatus according to any preceding claim wherein the thermoelectric cooling device comprises a Peltier cooling device.

6. Apparatus according to any preceding claim, wherein the heat exchange system utilises liquid coolant.

7. Apparatus according to any preceding claim, wherein the light source comprises a plurality of light emitting diode devices arranged in a two-dimensional array.

8. Apparatus according to claim 7, wherein at least two of the light emitting diodes in the array are packaged and arranged so that the separation between the centres of the light emitting diodes is less than the diameter of the notional circular cylinder that envelopes the packaging of the light emitting diodes.

9. Apparatus according to claim 7, wherein at least two of the light emitting diodes in the array share the same packaging.

10. Apparatus according to any preceding claim, wherein the heat conductor comprises a heat spreader.

11. Apparatus according to any preceding claim, wherein a further heat conductor is arranged to transfer heat from the thermoelectric cooling device to the heat exchange system.

12. Apparatus according to any preceding claim, wherein the cooling system comprises one or more heat pipes for conducting heat to or from a part of the cooling system.

13. Apparatus according to any preceding claim, wherein the thermoelectric cooling device is arranged to be controlled to

determine the heat transfer out of the heat conductor and/or into the heat exchange system.

14. Apparatus according to claim 13, wherein the apparatus includes a control means for controlling the current to the thermoelectric device.

15. A cooling system for a light source arrangement, the cooling system comprising:

i) a thermoelectric cooling device connected to a heat conductor; and

ii) a heat exchange system for removing heat from the thermoelectric cooling device, the cooling system being arranged to be connected to a light source via the heat conductor, the thermoelectric cooling device being positioned between the heat conductor and the heat exchange system.

16. A method of cooling a light source comprising the steps of:

a) providing and operating a light source including a light emitting diode device; and

b) cooling the light source by means of performing the following steps:

i) removing heat from the light source with a thermoelectric cooling device, and

ii) removing heat from the thermoelectric cooling device with a heat exchange system, the thermoelectric cooling device being positioned between the heat conductor and the heat exchange system.

17. A method according to claim 16, wherein the region of the cooling system at the junction between the heat conductor and the thermoelectric cooling device is maintained at a temperature of less than -10 degrees Celsius.

18. A method according to claim 16 or claim 17, wherein the light source is operated to produce light having an optical power density of greater than $0.1Wcm^{-2}$.

19. A method according to any of claims 16 to 18, wherein the light source is operated to emit light having an energy peak at a wavelength between 570nm and 600nm.

20. A method according to any of claims 16 to 19, wherein the rate of heat extracted from the light source is greater than $5Wcm^{-2}$.

21. A method of increasing the optical power density attainable with a light source including performing the method according to any of claims 16 to 20.